

Name: Master Algebra 1A Unit 4 Study Sheet

**Steps to Solving Equations:**

1. D istributive Property
2. C ombining like terms
3. S ubtraction A ddition
4. D ivision M ultiplication

**Examples:**

Ex 1:  $2x - 3 = -5$

$$\begin{array}{r} 2x - 3 = -5 \\ +3 \quad +3 \\ \hline 2x = -2 \\ \hline \frac{2x}{2} = \frac{-2}{2} \\ \hline x = -1 \end{array}$$

Ex 2:  $\frac{f}{2} + 8 = -1$

$$\begin{array}{r} \frac{f}{2} + 8 = -1 \\ -8 \quad -8 \\ \hline 2 \cdot \frac{f}{2} = -9 \cdot 2 \\ \hline f = -18 \end{array}$$

Ex 3:  $-4(x + 3) = 24$

$$\begin{array}{r} -4(x + 3) = 24 \\ -4x - 12 = 24 \\ +12 \quad +12 \\ \hline -4x = 36 \\ \hline \frac{-4x}{-4} = \frac{36}{-4} \\ \hline x = -9 \end{array}$$

Ex 4:  $6x - 3 + 2x = 4x + 9$

$$\begin{array}{r} 6x - 3 + 2x = 4x + 9 \\ 8x - 3 = 4x + 9 \\ -4x \quad -4x \\ \hline 4x - 3 = 9 \\ +3 \quad +3 \\ \hline 4x = 12 \\ \hline \frac{4x}{4} = \frac{12}{4} \rightarrow x = 3 \end{array}$$

**Justifications:**

Addition Property of Equality: when you add the same value to both sides of the equal sign

Subtraction Property of Equality: when you subtract the same value from both sides of the equal sign

Multiplication Property of Equality: when you multiply the same value to both sides of the equal sign

Division Property of Equality: when you divide the same value on both sides of the equal sign

Distributive Property: when you multiply a value to each term inside a parentheses

Combine Like Terms: when you add/subtract two or more like items that are on the same side of the equal sign

### Justification Practice

Ex 5: Given Equation: $-3(x + 2) + 2x = -9$	Property
$-3x - 6 + 2x = -9$	<u>Distributive</u>
$-1x - 6 = -9$	<u>combine like terms</u>
$-1x = -3$	<u>Addition Property of Equality</u>
$x = 3$	<u>Division Property of Equal.</u>

### Key Terms in Solving Equations

Isolate the variable: the main goal of solving equations

Inverse operations: doing the "opposite" operation

Substitution: checking your answer to an equation by "plugging" in the value for the variable

## Two Possible Solutions if Variables Cancel Out

<p>If you end with a false equation:</p> <p><u>No Solution</u></p> <p>Symbol: <u>NS</u> <math>\neq</math> <math>\emptyset</math></p>	<p>If you end with a true equation:</p> <p><u>Identity / Infinite</u></p> <p>Symbol: <u>I</u> IS <math>\infty</math></p>
--	--

<p>Ex 6:</p> $-2x + 3(4x - 5) = 5(2x + 4) - 35$ $-2x + 12x - 15 = 10x + 20 - 35$ $10x - 15 = 10x - 15$ $10x = 10x$ $x = x$ <p><u>I</u></p>	<p>Ex 7:</p> $7y + 3(2y - 8) = 8y + 24 + 5y$ $7y + 6y - 24 = 8y + 24 + 5y$ $13y - 24 = 13y + 24$ $0 \neq 48$ <p>NS</p>
--	--

## To Eliminate Fractions in an Equation

<p>If you have one fraction left next to a variable, multiply both sides of the = by the <u>reciprocal</u></p>	<p>If you have more than one fraction in an equation, multiply every single part of the equation by the <u>Least Common Denominator</u></p>
<p>Ex 8:</p> $\frac{4}{7}x + 3 = 7$ $7 \cdot \frac{4}{7}x = 4 \cdot 7$ $4x = \frac{28}{4}$ $x = 7$ <p><u>7</u></p>	<p>Ex 9:</p> <p>LCD</p> $\left(\frac{5}{2}x - \frac{1}{4} = -2\right) 4$ $10x - 1 = -8$ $10x = -7$ $x = \frac{-7}{10}$ $\frac{5}{2}\left(\frac{-7}{10}\right) - \frac{1}{4} = -2$ $-\frac{7}{4} - \frac{1}{4} = -2$ $-\frac{8}{4} = -2$ $-2 = -2$

